

## DEVELOPING DEVICE

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### Abstract

**PROBLEM TO BE SOLVED:** To provide a miniaturized developing device which contributes to the miniaturization of a color image forming device as a whole body without lowering transporting efficiency of toner, and which is capable of facilitating replacement of a toner replenishing vessel.

**SOLUTION:** This developing device is constituted such that the top and bottom surfaces of toner replenishing vessel 20, transporting part 30 and developing part 40 are arranged respectively on the same plane, whereas the rotating shafts of transporting rollers 21 and 22, blade-attached roller 31, agitating roller 41, and developing roller 43 are arranged respectively on the same height. Then, the device is composed so as to transport toner from the toner replenishing vessel 20 to a photoreceptor drum 4 in the approximately horizontal direction.

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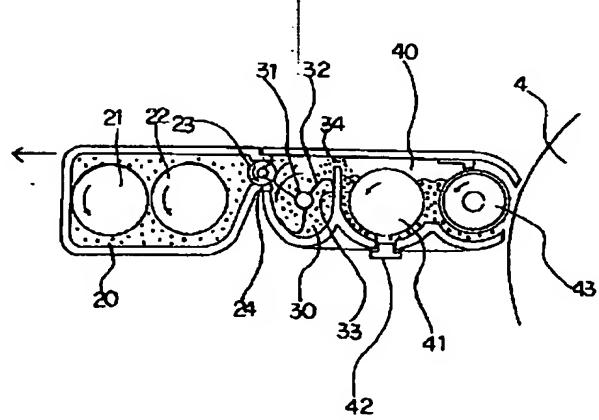
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(54) [発明の名称] 現像装置

(57) 【要約】

**【課題】**トナーの搬送効率を低下することなく、現像装置の小型化、ひいてはカラー画像形成装置全体の小型化を実現でき、かつトナー補給容器の交換を容易に行うことができる現像装置とする。

【解決手段】現像装置を構成するトナー補給容器20、搬送部30、および現像部40の上面および下面を同一平面とし、かつ搬送ローラ21、22、羽根付ローラ31、攪拌ローラ41、および現像ローラ43の回転中心軸が同一高さとなるように構成して、トナー補給容器20から感光体ドラム4までトナーを略水平方向に搬送するように構成する。



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**【特許請求の範囲】**

【請求項1】トナーを収納しつつ補給ローラの回転によりトナーを下流側に搬送するトナー補給容器と、該トナー補給容器から供給されるトナーを搬送する搬送部と、該搬送部から搬送されたトナーの攪拌を行った後に感光体への現像を行う現像部とよりなる現像装置において、前記トナー補給容器に回転によりトナーを前記補給ローラまで略水平方向に搬送する搬送手段を設け、前記搬送部に回転によりトナーを攪拌しつつ略水平方向に搬送する第1の攪拌手段を設け、前記現像部に回転によりトナーを攪拌しつつ略水平方向に搬送する第2の攪拌手段と前記感光体への現像を行う現像ローラとを設け、  
前記トナー補給容器、搬送部、および現像部の上面および下面を略同一平面に構成し、かつ前記搬送手段、第1の攪拌手段、第2の攪拌手段、および現像ローラの回転中心軸が同一高さとなるように構成したことを特徴とする現像装置。

**【発明の詳細な説明】****【0001】**

【発明の属する技術分野】本発明はファクシミリ、プリンタ、複写機等の画像形成装置内の現像装置に関し、特に複数の現像手段を有するカラー画像形成装置の現像装置に関するものである。

**【0002】**

【従来の技術】従来のカラー画像形成装置には、例えば单一のポリゴンモータにより各色（イエロー、マゼンタ、シアン、ブラック）毎に走査して单一の感光体ドラム上にカラー画像を形成させて中間転写体に転写し、中間転写体に全色のトナーが載った後に転写紙に転写する中間転写方式、あるいは单一のポリゴンモータにより各色毎に走査して单一の感光体ドラム上にカラー画像を形成させて直接転写体に巻き付けた転写紙に各色毎に転写し転写紙に全色のトナーが載った後に排紙する直接転写方式等が提案されている。

**【0003】**

【発明が解決しようとする課題】ところが、従来のカラー画像形成装置では、各色毎の現像装置を設ける必要があるために装置全体の小型化が難しく、かつ現像装置のトナー補給容器が複数あるために交換が難しくなってしまうという問題があった。

**【0004】**

【課題を解決するための手段】本発明は、上記問題に鑑みてなされたものであり、トナーを収納しつつ補給ローラの回転によりトナーを下流側に搬送するトナー補給容器と、トナー補給容器から供給されるトナーを搬送する搬送部と、搬送部から搬送されたトナーの攪拌を行った後に感光体への現像を行う現像部とよりなる現像装置において、トナー補給容器に回転によりトナーを補給ローラまで略水平方向に搬送する搬送手段を設け、搬送部に回転によりトナーを攪拌しつつ略水平方向に搬送する第50

1の攪拌手段を設け、現像部に回転によりトナーを攪拌しつつ略水平方向に搬送する第2の攪拌手段と前記感光体への現像を行う現像ローラとを設け、トナー補給容器、搬送部、および現像部の上面および下面を略同一平面とし、搬送手段、第1の攪拌手段、第2の攪拌手段、および現像ローラの回転中心軸が同一高さとなるようにした現像装置である。

【0005】このような構成により、現像装置の高さを抑えることができ、現像装置を略垂直状に配列して整列密度を高める構成となり、画像形成装置全体を小型化できる構成となる。

**【0006】**

【発明の実施の形態】以下、本発明の実施例を図面を用いて説明する。図1は、本発明の現像装置を配設したカラー画像形成装置を示す構成図であり、転写紙収納カセット1を下方に配設し、排紙収納トレイ2を上方に配設し、搬送路3を略垂直に形成し、装置の略中央に感光体ドラム4、感光体ドラム4の下方に光走査手段ユニット5、感光体ドラム周辺の搬送路3方向との反対位置に4つの現像器6a～6dを略垂直方向に配設し、感光体ドラム4の上方に中間転写ドラム7、中間転写ドラム7の上方の搬送路3中に定着器8を配設して構成する。

【0007】このような構成により、光走査ユニット5で画像信号に基づき各色毎に走査して感光体ドラム4に静電潜像を形成させ、現像器6a～6dで各色毎に感光体ドラム4上にカラー画像を形成させて中間転写ドラム7に転写し、中間転写ドラム7に4色のトナーが載った後に転写紙収納カセット1から搬送路3に搬送されている転写紙に転写し、転写紙を定着器8の加圧ローラ・加熱ローラでトナーを定着させて、排紙収納トレイ2に排紙する。図1の構成によると、無駄なスペースが無く、カラー画像形成装置全体を小型化できる。しかも、定着器8と現像器6a～6dとの間の距離を置くことができるため、現像器6a～6d内のトナーが定着器の熱による影響を防ぐ構成となる。また、図1のカラー画像形成装置は、底面に転写紙受入口Bを設けていために、カラー画像形成装置の下に給紙装置（不図示）を配設することも可能となる。

【0008】本発明の現像器6a～6cは、後述する構成により構造薄肉化をはかり配置上の高さを極力抑えて略垂直状に配列して整列密度を高めていることを特徴としており、カラー画像形成装置の側面部の開閉扉Aを開放すれば、現像器6a～6dの補給トナー容器20を水平方向から着脱できるように構成されている。

【0009】図2は、現像器6bの構成図であり、トナー補給容器20、搬送部30、現像部40となりなり、本発明は、トナー補給容器20、搬送部30、および現像部40の上面および下面を同一平面とした点、および搬送ローラ21、22、羽根付ローラ31、攪拌ローラ41、および現像ローラ43の回転中心軸が同一高さと

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なるように構成してトナー補給容器20から感光体ドラム4までトナーを略水平方向に搬送するように構成した点を特徴とする。

【0010】トナー補給容器20は、トナーを収容する容器で、図の矢印に示すように、略水平方向に着脱可能であり、搬送手段である搬送ローラ21、22と補給ローラ23を有し、トナーを補給する場合には、トナーを搬送ローラ21、22の回転により補給ローラ23まで搬送させ、補給ローラ23の回転で搬送部30にスリット34を通して送り込みをする。

【0011】搬送部30は、トナーを攪拌しつつスリット34を通して現像部40に搬送するための羽根付ローラ31を有する。羽根付ローラ31は、弹性を有する3枚の羽根32を有し、その羽根32が屈曲している状態から略直線上に延びるスリット34の近傍位置で羽根が跳ね上がる作用により、トナーを押し込むようになり、その状態を図3にて示している。羽根32は、弹性を有し、先端部が搬送部30内で摺擦しているので、トナーが付着固化することもなく、安定したトナー補給ができる。また、羽根32の材質は、マイラに代表される樹脂シート状の厚さ150～250μ迄のもので、羽根32の規模に応じ適宜その厚さを選定すればよく、羽根付ローラ31の軸の形状は、中実の鉄製軸材か中空の鉄製円筒材等とすればよい。

【0012】また、搬送部30と現像部40との間に仕切壁33を設け、仕切壁33の頂部より下部を現像部40の充填最大面にしているので、トナーが現像部40から搬送部30に逆流することがなく、安定した現像方法を維持することが出来る。

【0013】現像部40は、攪拌ローラ41、検知部42、現像ローラ43を有し、攪拌ローラ41で内部のキャリアとトナーを攪き混ぜながら、検知部42で透磁率の変化を磁気的に検知することによってトナーの濃度検知をし、トナー濃度が低下した場合にはトナー補給容器20にトナーを補給するように指令するような制御をする。このようにすることで、現像部40の内部では、常に一定の濃度が保たれる。また、最終的には現像ローラ

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43が感光体ドラム4に現像を行う。

【0014】

【発明の効果】以上より、本発明の現像装置によれば、トナー補給容器、搬送部、および現像部の上面および下面を略同一平面とし、かつトナー補給容器の搬送手段、搬送部の攪拌手段、現像部の攪拌手段と現像ローラの回転中心軸が同一高さとなるように構成してトナー補給容器から感光体までトナーを略水平方向に搬送するように構成することにより、トナーの搬送効率を低下することなく、現像装置の小型化、ひいてはカラー画像形成装置全体の小型化が実現でき、かつトナー補給容器の交換を容易に行うことができる現像装置を提供することができる。

【図面の簡単な説明】

【図1】本発明の現像装置を含むカラー画像形成装置を示す図である。

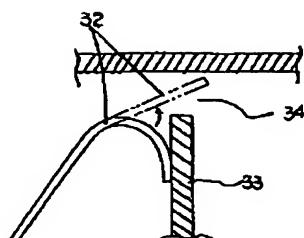
【図2】本発明の現像装置を示す図である。

【図3】本発明の現像装置の一部拡大図を示す図である。

【符号の説明】

- 1：転写紙収納カセット
- 2：排紙収納トレイ
- 3：搬送路
- 4：感光体ドラム
- 5：光走査手段ユニット
- 6a～6d：現像器
- 7：中間転写ドラム
- 8：定着器
- 20：トナー補給容器
- 21, 22：搬送ローラ
- 23：補給ローラ
- 30：搬送部
- 31：羽根付ローラ
- 40：現像部
- 41：攪拌ローラ
- 43：現像ローラ

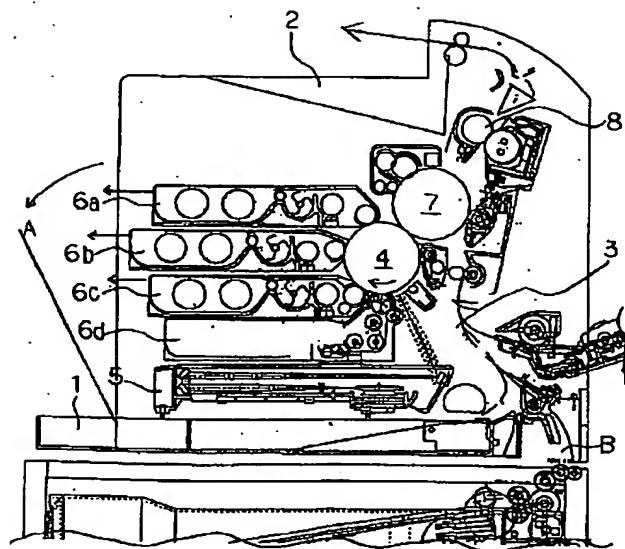
【図3】



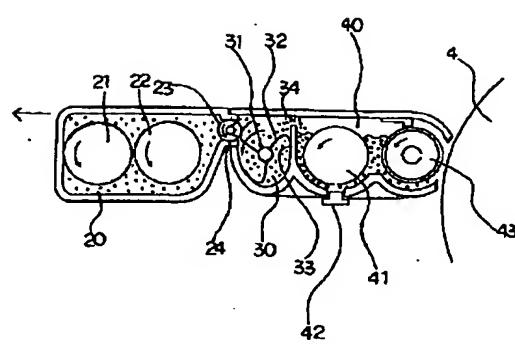
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【図 1】



【図 2】



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**CLAIMS****[Claim(s)]**

[Claim 1] The toner supply container which contains a toner and conveys a toner to the downstream by rotation of a supply roller, In the developer which consists of the conveyance section which conveys the toner supplied from this toner supply container, and the development section which performs development to a photo conductor after stirring the toner conveyed from this conveyance section A conveyance means by which even said supply roller conveys a toner to an abbreviation horizontal direction by rotation to said toner supply container is established. The 1st stirring means which stirs a toner by rotation in said conveyance section, and is conveyed to an abbreviation horizontal direction is established. The developing roller which performs development to the 2nd stirring means and said photo conductor which stirs a toner by rotation in said development section, and is conveyed to an abbreviation horizontal direction is formed. The developer characterized by constituting so that the top face and inferior surface of tongue of said toner supply container, the conveyance section, and the development section may be constituted at an abbreviation same flat surface and said conveyance means, the 1st stirring means, the 2nd stirring means, and the center-of-rotation shaft of a developing roller may serve as the same height.

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[Translation done.]

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## DETAILED DESCRIPTION

## [Detailed Description of the Invention]

## [0001]

[Field of the Invention] This invention relates to the developer of the color picture formation equipment which has two or more development means especially about the developer in image formation equipments, such as facsimile, a printer, and a copying machine.

## [0002]

[Description of the Prior Art] conventional color picture formation equipment -- for example, a single polygon motor -- each color (yellow --) Scan for every Magenta, cyanogen, and black, make a color picture form in single photo conductor drum lifting, and it imprints on a middle imprint object. The middle imprint method imprinted to a transfer paper after the toner of a total color appears in a middle imprint object, Or the direct imprint method to which paper is delivered after it imprints for every color to the transfer paper which scanned for every color by the single polygon motor, was made to form a color picture in single photo conductor drum lifting, and was twisted around the direct imprint object and the toner of a total color appears in a transfer paper is proposed.

## [0003]

[Problem(s) to be Solved by the Invention] However, with conventional color picture formation equipment, since it was necessary to form the developer for every color, the miniaturization of the whole equipment was difficult, and since there were two or more toner supply containers of a developer, there was a problem that exchange will become difficult.

## [0004]

[Means for Solving the Problem] The toner supply container which this invention is made in view of the above-mentioned problem, and contains a toner, and conveys a toner to the downstream by rotation of a supply roller, In the developer which consists of the conveyance section which conveys the toner supplied from a toner supply container, and the development section which performs development to a photo conductor after stirring the toner conveyed from the conveyance section A conveyance means by which even a supply roller conveys a toner to an abbreviation horizontal direction by rotation to a toner supply container is established. The 1st stirring means which stirs a toner by rotation in the conveyance section, and is conveyed to an abbreviation horizontal direction is established. The developing roller which performs development to the 2nd stirring means and said photo conductor which stirs a toner by rotation in the development section, and is conveyed to an abbreviation horizontal direction is formed. It is the developer with which make the top face and inferior surface of tongue of a toner supply container, the conveyance section, and the development section into an abbreviation same flat surface, and it was made for a conveyance means, the 1st stirring means, the 2nd stirring means, and the center-of-rotation shaft of a developing roller to serve as the same height.

[0005] It becomes the configuration which can stop the height of a developer, arranges a developer in the shape of an abbreviation perpendicular, and raises an alignment consistency by such configuration, and becomes the configuration which can miniaturize the whole image formation equipment.

## [0006]

[Embodiment of the Invention] Hereafter, the example of this invention is explained using a drawing. Drawing 1 is the block diagram showing the color picture formation equipment which arranged the developer of this invention. Arrange the transfer paper receipt cassette 1 caudad, and the delivery receipt tray 2 is arranged up. Form the conveyance way 3 in an abbreviation perpendicular, and four development counters 6a-6d are arranged in the center of abbreviation of equipment under the photo conductor drum 4 and the photo conductor drum 4 in an opposition with the light-scanning means unit 5 and the conveyance way 3 direction of the photo conductor drum circumference at an abbreviation

perpendicular direction. A fixing assembly 8 is arranged and constituted above the photo conductor drum 4 all over the upper conveyance way 3 of the middle imprint drum 7 and the middle imprint drum 7.

[0007] Based on a picture signal, scan for every color in the light-scanning unit 5, and an electrostatic latent image is made to form in the photo conductor drum 4 by such configuration. Make a color picture form on the photo conductor drum 4 for every color with development counters 6a-6d, and it imprints to the middle imprint drum 7. After the toner of four colors appears in the middle imprint drum 7, it imprints to the transfer paper currently conveyed from the transfer paper receipt cassette 1 on the conveyance way 3, and a toner is fixed with the pressurization roller and heating roller of a fixing assembly 8, and a transfer paper is delivered to the delivery receipt tray 2. According to the configuration of drawing 1, there is no useless tooth space and the whole color picture formation equipment can be miniaturized. And since the distance between a fixing assembly 8 and development counters 6a-6d can be kept, the toner in development counter 6a-6d serves as a configuration which prevents the effect by the heat of a fixing assembly. Moreover, since the color picture formation equipment of drawing 1 has formed the transfer paper acceptance opening B in the base, it becomes possible [ also arranging feed equipment (un-illustrating) in the bottom of color picture formation equipment ].

[0008] The development counters 6a-6c of this invention are characterized by stopping the height on scale arrangement as much as possible, arranging structure thinning in the shape of an abbreviation perpendicular, and raising the alignment consistency by the configuration mentioned later, and if the closing motion door A of the lateral portion of color picture formation equipment is opened, they are constituted so that the development counters [ 6a-6d ] supply toner bottle 20 can be detached and attached from a horizontal direction.

[0009] Drawing 2 is the block diagram of development counter 6b, and consists of the toner supply container 20, the conveyance section 30, and the development section 40. This invention The point which made the top face and inferior surface of tongue of the toner supply container 20, the conveyance section 30, and the development section 40 the same flat surface, And it is characterized by the point which constituted so that the center-of-rotation shaft of the conveyance rollers 21 and 22, the roller 31 with a wing, the stirring roller 41, and a developing roller 43 might serve as the same height, and was constituted so that the toner supply container 20 to the photo conductor drum 4 might convey a toner to an abbreviation horizontal direction.

[0010] The toner supply container 20 is a container which holds a toner, and as shown in the arrow head of drawing, when it is removable to an abbreviation horizontal direction, it has the conveyance rollers 21 and 22 and the supply roller 23 which are a conveyance means and it supplies a toner, even the supply roller 23 makes a toner convey by rotation of the conveyance rollers 21 and 22, and it sends into the conveyance section 30 through a slit 24 by rotation of the supply roller 23.

[0011] The conveyance section 30 has the roller 31 with a wing for stirring a toner and conveying in the development section 40 through a slit 34. The roller 31 with a wing has three wings 32 which have elasticity, according to the operation to which a wing leaps up in the near location of the slit 34 prolonged on an abbreviation straight line from the condition that the wing 32 is crooked, comes to push in a toner and shows the condition in drawing 3. A wing 32 can perform stable toner supply, without a toner carrying out adhesion solidification, since it has elasticity and the point is carrying out rubbing within the conveyance section 30. Moreover, what is necessary is just to let the configuration of the shaft of the roller 31 with a wing be the iron shaft material of a solid, iron cylinder material in the air, etc. that the quality of the material of a wing 32 is a thing to the thickness 150-250micro of the shape of a resin sheet represented by the Mylar, and should just select the thickness suitably according to the scale of a wing 32.

[0012] Moreover, since a bridge wall 33 is established between the conveyance section 30 and the development section 40 and it is made into the restoration maximum side of the development section 40 below the crowning of a bridge wall 33, the development approach which a toner did not flow backwards in the conveyance section 30 from the development section 40, and was stabilized is maintainable.

[0013] The development section 40 carries out control which it is ordered so that a toner may be supplied to the toner supply container 20, when it has the stirring roller 41, the detection section 42, and a developing roller 43, an internal carrier and an internal toner are detected with the stirring roller 41, it detects change of permeability magnetically in the detection section 42 with \*\*\*\*\*\*, concentration detection of a toner is carried out and toner concentration falls. By doing in this way, fixed concentration is always maintained inside the development section 40. Moreover, finally a developing roller 43 develops negatives to the photo conductor drum 4.

[0014]

[Effect of the Invention] As mentioned above, according to the developer of this invention, the top face and inferior surface of tongue of a toner supply container, the conveyance section, and the development section are made into an abbreviation same flat surface. And by constituting so that the center-of-rotation shaft of the conveyance means of a

toner supply container, the stirring means of the conveyance section, the stirring means of the development section, and a developing roller may serve as the same height, and constituting so that a toner supply container to a photo conductor may convey a toner to an abbreviation horizontal direction The developer for which the miniaturization of a developer, as a result the miniaturization of the whole color picture formation equipment can be realized, and a toner supply container can be exchanged easily can be offered without falling the conveyance effectiveness of a toner.

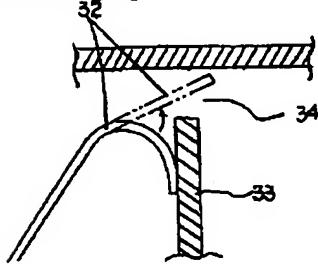
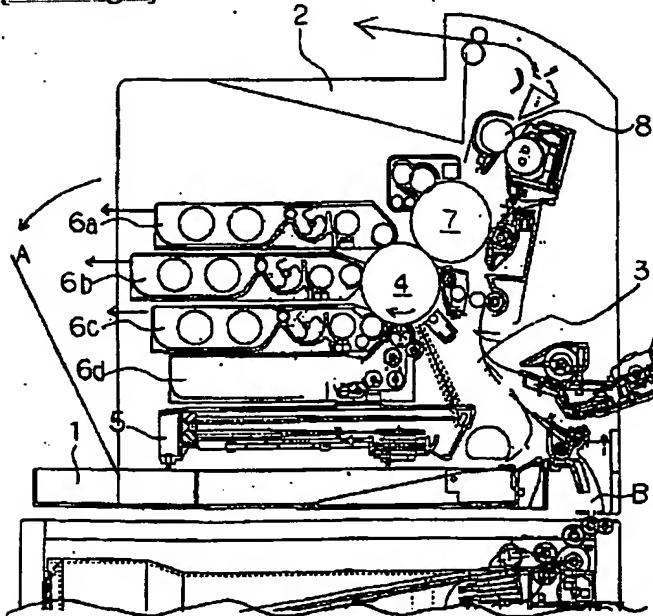
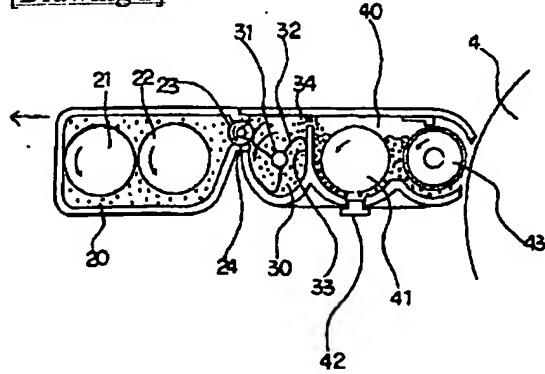
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[Translation done.]

**\* NOTICES \***

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

**DRAWINGS****[Drawing 3]****[Drawing 1]****[Drawing 2]**

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[Translation done.]